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ABSTRACT

The three purposes of this study were (1) to examine the effect of the frequency of Latin-suffixed words on the cloze performance of readers, (2) to examine the effect of reading materials in different content areas on cloze performance, and (3) to determine whether general reading ability differentially affected cloze scores in various content areas. Ninety articles from three content areas (Movies-T.V.-Theatre, Science, and Human Interest) were selected from five newspapers. The number of Latin suffixes per article (only 200 words of each article were used) was determined, and the articles were classified as high, medium, or low in density of Latin suffixes. The subjects, 225 eighth graders from a middle-class Southern California area, were pretested on a standardized reading test. Each subject was given two articles of the same content area and Latin suffix density to read. Then they were given a cloze test on the two articles. It was found that (1) articles with high density of Latin suffixes were more difficult in terms of cloze performance than low and medium density articles, (2) cloze performance was reliably superior with articles in the Science area, and (3) reading ability did not seem to differentially relate to performance over the content areas. References and tables of data are included. (AL)

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READING COMPREHENSION DIFFICULTY AS A FUNCTION OF CONTENT AREA AND LINGUISTIC COMPLEXITY

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Reading comprehension may be viewed as a function of the reader's language competence, the subject matter of the language message, and the syntactic and morphological complexity of the language message itself. It has been generally recognized (King, 1959) that comprehension is differentially affected by material in different Content Areas. In terms of the above conception of comprehension this effect may be a function of the necessary background information required of the S, the author's writing style, the vocabulary specific to certain Content Areas, the interests and attitudes of the reader or listener concerning the various subject matters of Content Areas, and the linguistic and morphological complexity with which passages in different Content Areas are generally generated (Farr, Jenkins & Paterson, 1951; Gunning, 1952; DeVito, 1965).

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The purpose of this study was to determine whether passages concerned with different subject matter (Content Areas) differed in some dimensions of linguistic complexity and if so whether controlling these variables would result in differences in comprehension as measured by cloze test performance. The study also investigated the relationship of Ss' general reading ability and their comprehension of different Content Areas.

PRELIMINARY ANALYSIS

Five randomly chosen newspaper articles in each of ten different Content Areas from the Los Angeles Times were analyzed, using three syntactic and morphological variables (dependent clauses, nominal modifiers, and the proportion of suffixes of Latin origin). These variables were chosen because they had previously (Aquino, 1968) been found to be the best predictors of cloze performance of 59 such variables investigated. The mean frequency of occurrence for each of the three variables for each Content Area is presented in Table 1. To test the reliability of the differences in means, Duncan Multiple Range Tests were applied. The results of this analysis indicated that the proportion of suffixes of Latin origin (L-suffix density) yielded 15 reliable differences between Content Area pairs while dependent clauses and nominal modifiers yielded 5 and 10 reliable differences between Content Area pairs, respectively. Since L-suffix density was the most successful variable in discriminating Content Areas this variable was chosen as the independent variable for the main study. Three Content Areas were chosen for the main study on the basis that the mean of each was significantly different from the other two. A second criterion for Content Area selection was that a wide sampling of passages with varying degrees of L-suffix density could be obtained to permit a factorial study of L-suffix density effects. The three Content Areas selected were Science, Human Interest, and T.V.--Movies--Theatre.

METHOD

MATERIALS

One hundred newspaper articles from each of the three Content Areas were taken from five daily newspapers (Los Angeles Times, New York Times, Chicago Tribune, Philadelphia Inquirer, and the Washington Post). These newspapers were chosen because they represented a wide cross section of the largest dailies and were felt to be representative of newspaper writing. Twenty articles were chosen from each newspaper in each Content Area. All articles were chosen from issues of November and December, 1967. Only the first 200 words (or the end of the sentence closest to 200 words) were considered for this study. The number of L-suffixes were counted and the proportion of L-suffixes per 200 words was calculated for each article. The criterion for determining a L-suffix was whether it was so designated by An Etymological Dictionary of the English Language (Skeat, 1963). Proportions ranged from .000 to .200.

Table 1

Mean Frequency of Occurrence of Three Linguistic Variables in Passages from Ten Content Areas

Content Area	Latin Suffixes	Dependent Clauses	Nominal Modifiers
Sports	15.0	27.2	2.2
Human Interest	15.6	31.0	5.0
Fashion	18.5	32.0	3.8
Arts	21.6	22.4	3.4
T.V.--Movies--Theatre	22.8	30.4	4.0
Religion	26.3	25.2	3.6
Government	27.2	34.4	5.6
Labor and Business	27.6	43.6	2.8
War	27.8	33.8	4.6
Science	30.4	33.0	4.8

Frequency distributions for each Content Area indicated that proportions tended to cluster at the high end for Science and at the low end for T.V.--Movies--Theatre with Human Interest in the middle. On the basis of the distributions, proportions of .01 to .05 were classified as "Low," .06 to .10 as "Medium," and .11 to .15 as "High". Ten articles from each Content Area at each level were chosen at random with the restriction that two articles would be chosen from each of the five newspapers for each Content Area and level. It was not possible to meet this criterion exactly but only a few exceptions occurred. In some cases it was not possible to obtain two articles at either the "High" or "Low" level in a content area from a given newspaper.

PROCEDURE

The articles chosen for the final study were made into cloze tests by deleting every fifth word and replacing it with a blank of standard length. Each article was tested on five Ss. Each S receiving a passage was given a cloze test wherein deletions began with either the first, second, third, fourth, or fifth word. Therefore, every word of each article was tested once. Each S read and responded to two articles during a one hour testing period. Articles were randomly paired with the restriction that they both be in the same Content Area and at the same level of L-suffix density. Ss were tested in groups of approximately 25. E read the instructions to the class and negotiated a sample test with the Ss. All Ss were tested by one E and were given 40 minutes to complete the two passages. Stanford Reading Achievement Test scores on all Ss were obtained from school records. These tests were administered approximately six months prior to this study. Twenty-five Ss were tested under each of the nine treatment conditions investigated.

SUBJECTS

The Ss were 225 eighth graders from one Southern California school district. The district is a predominantly lower-middle to upper-middle class community. The Stanford Reading Achievement Test (SRAT) scores indicated that the sample included a wide range of reading ability.

RESULTS

Cloze items were scored correct only if an insertion was the exact word deleted; accurate spelling was not required. The total score for each S was calculated by combining the two passages negotiated by each S and calculating the ratio of correct insertions over the total number of deletions.

To ensure that the random assignment of Ss to Content Area and levels of L-suffix density did not result in group differences in reading ability, the SRAT scores were compared. A 3 x 3 analysis of

variance showed no reliable differences between groups. The means are presented in Table 2. The means and the analysis of variance give strong indication that the experimental groups were comparable on SRAT scores.

Mean cloze test performance data are presented in Table 3. The mean proportion of correct responses is highest for Science and lowest for T.V.--Movies--Theatre. Mean performance was the same for Low and Medium levels of L-suffix density and somewhat lower for the High level. A 3 x 3 analysis of variance (Table 4) indicated significant differences for both main effects (Content Area, L-suffix density). Specific comparison of means using the Duncan Multiple Range Test showed that the only reliable difference between Content Areas was between Science and T.V.--Movies--Theatre. For L-suffix density, the High mean was significantly lower than either the Low or Medium means.

The correlations between SRAT and cloze scores are presented in Table 5. Separate correlations were computed for each Content Area collapsed over L-suffix density levels and for each level of L-suffix density collapsed over Content Area. Comparable correlations (.612 and .644) were obtained for Human Interest and T.V.--Movies--Theatre but a somewhat lower correlation between Science and SRAT (.515). Similarly, comparable correlations were obtained between SRAT and Medium and Low L-suffix density levels (.651 and .610) but a somewhat lower correlation between High and SRAT (.508).

To shed further light on the difference in cloze performance between Science and T.V.--Movies--Theatre, several ad hoc analyses of the passages were performed. An analysis of the mean number of sentences per passage and the mean number of words per sentence revealed that Science passages contained fewer but longer sentences than T.V.--Movies--Theatre. The mean number of sentences per passage was 8.86 and 10.90 for Science and T.V.--Movies--Theatre, respectively. The mean number of words per sentence was 22.98 and 18.86 for the two Content Areas respectively. Analysis of variance indicated that both of these differences were statistically significant at the .05 level [$F(2, 87)= 5.39$], [$F(2,87)=3.42$]. Certain modifiers such as prepositional phrases and relative clauses make sentences longer. It was hypothesized that since Science passages had longer but fewer sentences they would contain more prepositions. The mean number of prepositions in Science passages was 29.0 and 23.7 for T.V.--Movies--Theatre. Analysis of variance indicated that this difference was reliable at the .01 level [$F(1, 58)= 23.40$]. Prepositions are essentially relater words which signal a relationship of dependency for the object of the preposition with respect to the item modified. As such, prepositions are often uniquely determined by the context. Therefore, Science passages having more prepositions, are easier for the Ss when comprehension is tested by the cloze procedure. Further inspection of the passages of these two Content Areas suggested that T.V.--Movies--Theatre passages were

Table 2

Mean SRAT Scores at each Content Area at each Level of Latin-Suffix Density

Latin-Suffix Density		Content Area			
		Science	Human Interest	T.V.--Movies--Theatre	Mean
∞	High	8.20	8.34	8.58	8.37
	Medium	9.10	8.07	7.80	8.39
	Low	8.89	8.20	8.26	8.45
	Mean	8.73	8.20	8.28	

Table 3

Mean Cloze Performance as a Function of Content Area and Level of Latin-Suffix Density (Mean Proportion Correct)

Level of Latin-Suffix Density	Content Area			
	Science	Human Interest	T.V.--Movies--Theatre	Mean
High	.290	.292	.280	.287
Medium	.346	.374	.292	.337
Low	.398	.303	.302	.335
Mean	.345	.323	.292	

Table 4

Analysis of Variance of Cloze Scores

Source	df	SS	MS	F
Content Area (CA)	2	.107	.054	3.176*
Latin-Suffix Density (LS)	2	.118	.059	3.471*
CA x LS	4	.131	.033	1.941
Error	216	2.509	.017	

* $p < .05$

Table 5

Correlations Between Cloze Scores and SRAT Scores at Each Level of Latin-Suffix Density and at Each Content Area

Treatment	Correlation
Science	.515
Human Interest	.612
T.V.--Movies--Theatre	.644
High	.508
Medium	.651
Low	.610

generally written in more colloquial language and contained more proper nouns and compounds.

DISCUSSION

The result that there is a reliable difference in cloze performance between the High level of L-suffix density and both Medium and Low levels suggests that passages in content areas which normally contain a high proportion of L-suffixes should be more difficult in terms of cloze performance than passages in content areas in which few L-suffixes normally appear. Preliminary analyses of Content Areas indicated that Science passages from newspapers contain significantly more L-suffixes than either of the other two Content Areas under investigation. The fact that Science passages give the highest cloze performance when L-suffixes are controlled suggests that the proportion of L-suffixes is a reasonably powerful predictor of cloze difficulty. However, the fact that cloze performance was not differentially affected by the Low and Medium levels suggests that a rather high level of L-suffixes is necessary before this variable appreciably affects cloze scores. It must also be pointed out that as a variable, L-suffix density covaries with several other variables. Words containing L-suffixes tend to be longer words than non-L-suffixed words and typically less frequent or familiar in the language.

The reliable superiority of cloze performance on Science to that of T.V.--Movies--Theatre seems to be a function of several variables. Since Science articles contained significantly longer and fewer sentences but an equal number of words, there were a greater number of prepositions in the Science passages. In terms of cloze tests, function words are generally easier than content words because the former, especially prepositions, are uniquely determined by the linguistic context. Other factors contributing to the observed Content Areas difference were that the T.V.--Movies--Theatre passages were generally more colloquial; contained more proper nouns and compounds and were often concerned with more than one topic per passage. These factors would have the effect of reducing context clues and both syntactic and semantic redundancies.

Results of the correlational analyses between SRAT and cloze scores by Content Areas and L-suffix density levels indicated that the correlations are well within the range of previous investigations (Fletcher, 1959; Mosberg, Potter & Cornell, 1968; Ruddell, 1965). Although a somewhat lower correlation was obtained for Science than the other two Content Areas, reading ability does not appear to be differentially related to differences in cloze performance over Content Areas.

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